IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of	
CASTLEBERRY	
Serial No.: 10/670,531	Examiner Gellner
Filed: September 26, 2003	Group Art Unit 3643
For: AGRICULTURAL FOAM GROWING MATERIAL	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

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Sir:

APPEAL BRIEF

REAL PARTY IN INTEREST

The real party in interest is the appellant, Wayne Castleberry.

RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences or judicial proceedings known to appellant or its legal representatives which may be related to, directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

STATUS OF THE CLAIMS

Claims 1-5 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 in further view of University of Florida (Ingram, Henley, Yeager 2003, *Growth Media for Container Grown Ornamental Plants*, University of Florida Institute of Food and Agricultural Sciences, viewed 10 April 2006, <http://edis.ifas.ufl.edu/CN004>). Claims 6 and 7 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view of Garrett '672 and University of Florida Growth Media reference in further view of Buckman and Brady (Buckman & Brady, 1969, The Nature And Properties Of Soils, Macmillan). Claims 8 - 11 and 13 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view of Garrett '672 and University of Florida Growth Media reference in further view of Cook (Ask a Scientist) (Cook 2002, *Ask A Scientist / Environmental Earth Science Archive / Soil Pore Size Determination*, Div. of Educational Programs, Argonne National Laboratory, viewed 10 April 2006, http://www.newton.dep.anl.gov/askasci/env99/env201.htm). Claim 12 is rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view of Garrett '672 and University of Florida Growth Media reference in further view of Decker U.S. Patent Number 5,899,020. Claims 14 - 15 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view of Garrett '672 and University of Florida Growth Media reference in further view of Caron et al. U.S. Patent Number 6,178,691. Claims 16 – 19 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view of Garrett '672 in further view of Cook (Ask a Scientist); University of Florida Growth Media reference.; and, Caron et al. '691. Claims 20 – 23, 25, and 26 are rejected under 35 USC 103(a) as being unpatentable over Hann et al. '433 in view

of Garrett '672 in further view of Cook (Ask a Scientist); University of Florida Growth Media reference.; and, Caron et al. '691. Claims 1-23, 25 and 26 are being appealed.

STATUS OF THE AMENDMENTS

The Examiner issued a first final rejection on March 4, 2005 rejecting the claims currently in the case. A Response (no amendments were made to the claims) was made after the final rejection presenting arguments as to why the combined cited references were not valid prior art and a Notice of Appeal was filed. The Response was not entered as the Examiner held that the purposed amendment was not deemed to place the application in better form for appeal by materially or simplifying the issued for appeal. The Brief was filed and prior to the time for filing the Examiner's Brief, the Examiner reopened examination, citing new art. The Examiner issued a first rejection which was responded to by an Amendment on October 18, 2006 and the Examiner issued a second final rejection on January 10, 2007, again rejecting the claims currently in the case. An amendment was presented on July 10, 2007 after the second final rejection presenting arguments as to why the combined cited references were not valid prior art and a second Notice of Appeal filed. An Advisory Action of July 18, 2007 treated the Amendment as a Request for Reconsideration and stated that the Amendment of July 10, 2007 did not place the application in condition for allowance.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The subject matter of independent claim 1 is directed toward a horticultural growing medium haying a flexible diphenylmethane diisocyanate foam material without filler material (p. 6,

lns. 4, 5) having a cation exchange capacity ranging from about 1.0 to about 1.5 (p. 8, lns. 2, 3) capable of supporting plant growth (p. 8, lns. 4-10).

The subject matter of dependent claim 2 is directed toward the horticultural growing medium of claim 1, wherein the exchange capacity is about 1.25 (p. 8, ln. 4).

The subject matter of dependent claim 3 is directed toward the horticultural growing medium of claim 1, wherein the diphenylmethane diisocyanate foam material is taken from a group consisting of polymeric diphenylmethane diisocyanate, crude diphenylmethane diisocyanate, 4,4'-, 2,4'-, 2,2'-diphenylmethane diisocyanate (p. 6, lns. 10-15).

The subject matter of dependent claim 4 is directed toward the horticultural growing medium of claim 1, wherein the diphenylmethane diisocyanate foam material is polymeric diphenylmethane diisocyanate (p. 6, ln. 14).

The subject matter of dependent claim 5 is directed toward the horticultural growing medium of claim 1, wherein the diphenylmethane diisocyanate foam material is one or a mixture of 2,2'-, 2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), polymeric MDI, crude MDI, namely, products of crude diaminodiphenyl methane or a mixture of the same (p. 6, lns. 13-15).

The subject matter of dependent claim 6 is directed toward the horticultural growing medium of claim 1, wherein the foam material has a neutral pH ranging from 6.8 to 7.8 (p. 7, ln. 1; p. 8, ln. 9).

The subject matter of dependent claim 7 is directed toward the horticultural growing medium of claim 1, wherein the foam material is highly porous and maintains a 60 to 40 air to water ratio (p. 7, lns. 5-10).

The subject matter of dependent claim 8 is directed toward the horticultural growing

medium of claim 1, wherein the foam material has at least 50% of its pores by foam volume ranging in size between 10 and 200 microns (p. 7, lns. 15, 16).

The subject matter of dependent claim 9 is directed toward the horticultural growing medium of claim 1, wherein the foam material has about 50% of its pores by foam volume ranging in size from about 40 to about 90 microns (p. 7, ln. 16).

The subject matter of dependent claim 10 is directed toward the horticultural growing medium of claim 1, wherein the foam material has pores ranging from 20% to about 25% by foam volume which range in size between about 0.2 microns to about 10 microns (p. 7, lns. 18-20).

The subject matter of dependent claim 11 is directed toward the horticultural growing medium of claim 1, wherein the foam material has pores ranging from about 25% to about 35% by foam volume which range in size between about 300 microns to about 800 microns (p. 7, lns. 21, 22).

The subject matter of dependent claim 12 is directed toward the horticultural growing medium of claim 1, wherein the foam material is substantially sterile (p. 6, ln. 22 – p. 7, ln. 1).

The subject matter of dependent claim 13 is directed toward the horticultural growing medium of claim 1, wherein the foam material has pores of about 30% by foam volume which range in size between about 300 microns to about 800 microns (p. 7, lns. 21, 22).

The subject matter of dependent claim 14 is directed toward the horticultural growing medium of claim 1, wherein the foam material has a total porosity ranging from 85% to 95% (p. 7, ln. 4).

The subject matter of dependent claim 15 is directed toward the horticultural growing medium of claim 1, wherein the foam material has a total porosity of about 90% to 92% (p. 7, lns.

4-5).

The subject matter of independent claim 16 is directed toward a horticultural growing medium constructed of a sterile hydrophilic unfilled foam material (p. 6, ln. 22; p. 7, ln. 1) made of diphenylmethane diisocyanate (p. 6, lns. 12-15) having at least 50% of its pores by foam volume ranging in size between 10 and 200 microns (p. 7, lns. 15, 16) with a cation exchange capacity ranging from about 1.0 to about 1.5 (p. 8, lns. 2-4), the foam material having a total porosity ranging from about 85% to about 95% (p. 7, ln. 4) and a neutral pH ranging from 6.8 to 7.8 (p. 7, ln. 1; p. 8, ln. 9) capable of supporting plant growth (pg. 8, lns. 4-10).

The subject matter of dependent claim 17 is directed toward the horticultural growing medium of claim 16, wherein the foam material is at least one diphenylmethane diisocyanate taken from a group consisting of crude, polymeric, 4,4'-, 2,4'- and 2,2'-diphenylmethane diisocyanate (p. 6, lns. 10-15).

The subject matter of dependent claim 18 is directed toward the horticultural growing medium of claim 16, wherein the foam material is polymeric diphenylmethane diisocyanate (p. 6, ln. 14).

The subject matter of dependent claim 19 is directed toward the horticultural growing medium of claim 16, wherein the foam material is one or more of 2,2'-, 2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), crude MDI, polymeric MDI or a mixture of the same (p 6, lns. 13-15).

The subject matter of independent claim 20 is directed toward a horticultural growing medium constructed of a substantially sterile unfilled foam material (p. 6, ln. 22; p. 7, ln. 1) made of polymeric diphenylmethane diisocyanate taken from a group consisting of one or more of 2,2'-,

2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), crude MDI, products of crude diaminodiphenyl methane including polymeric MDI or a mixture of the same (p. 6, lns. 12-15), having at least 50% of its pores ranging in size between 10 and 200 microns (p. 7, lns. 15, 16) with a cation exchange capacity ranging from about 1.0 to about 1.5 (p. 8, lns. 2-4), with a total porosity ranging from about 90% to about 92% (p. 7, lns. 4, 5) and a neutral pH from 6.8 to 7.8 (p. 7, ln. 1), capable of supporting plant growth (pg. 8, lns. 4-10).

The subject matter of dependent claim 21 is directed toward the horticultural growing medium of claim 20, wherein the foam material is a sheet with seeds secured thereto (p. 9, lns. 4-5 & Figure 5).

The subject matter of dependent claim 22 is directed toward the horticultural growing medium of claim 20, wherein the foam material is a shaped block with an aperture cut therein (p. 9, ln 1).

The subject matter of dependent claim 23 is directed toward the horticultural growing medium of claim 20, wherein the cation exchange capacity is about 1.0 (p. 8, ln. 2).

The subject matter of independent claim 25 is directed toward a horticultural growing medium constructed of a hydrophilic, substantially sterile (p. 6, ln. 22 – p. 7, ln. 1) diphenylmethane diisocyanate foam material without filler material taken from a group consisting of polymeric diphenylmethane diisocyanate, crude diphenylmethane diisocyanate, 4,4'-, 2,4'-, 2,2'-diphenylmethane diisocyanate (p. 6, lns. 13-15) and having a neutral pH ranging from 6.8 to 7.8 (p. 7, ln. 1), the material having a cation exchange capacity ranging from about 1.0 to about 1.5 (p. 8, lns. 2-3), capable of supporting plant growth (pg. 8, lns. 4-10).

The subject matter of independent claim 26 is directed toward a horticultural growing

medium constructed of a hydrophilic flexible (p. 6, ln. 5) sterile (p. 6, ln. 22 – p. 7, ln. 1) foam material made of diphenylmethane diisocyanate the foam material being taken from a group consisting of crude, polymeric, 4,4'-, 2,4'- and 2,2'-diphenylmethane diisocyanate (p. 6, lns. 13-15) having at least 50% of its pores by foam volume ranging in size between 10 and 200 microns (p. 7, lns. 15-16) with a cation exchange capacity ranging from about 1.0 to about 1.5 (p. 8, lns. 2-3), the foam material having a total porosity ranging from about 85% to about 95% (p. 7, lns. 4); the horticultural growing medium being capable of supporting plant growth (pg. 8, lns. 4-10).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(A) Whether the invention as defined in Claims 1-5 is obvious and therefore unpatentable under 35 USC 103(a) over the cited prior art references to Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and further in view of University of Florida *Growth Media* publication reference.

(B) Whether the invention as defined in Claims 6 and 7 is obvious and therefore unpatentable under 35 USC 103(a) over the prior art references to Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and University of Florida *Growth Media* publication reference and in further view of the publication of Buckman and Brady.

(C) Whether the invention as defined in Claims 8 - 11 and 13 is obvious and therefore unpatentable under 35 USC 103(a) over the prior art references to Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and University of Florida *Growth Media* publication reference and in further view of Cook (Ask a Scientist) publication.

(D) Whether the invention as defined in Claim 12 is obvious and therefore unpatentable under 35 USC 103(a) over the prior art references to Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and University of Florida *Growth Media* publication reference and in further view of Decker U.S. Patent Number 5,899,020.

(E) Whether the invention as defined in Claims 14 - 15 is obvious and therefore unpatentable under 35 USC 103(a) over the prior art references Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and University of Florida *Growth Media* publication reference and in further view of Caron et al. U.S. Patent Number 6,178,691.

(F) Whether the invention as defined in Claims 16 – 23, 25, and 26 is unpatentable under 35 USC 103(a) over the prior art references to Hann et al. U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 in further view of Cook (Ask a Scientist) publication; University of Florida *Growth Media* publication reference; and, Caron et al. U.S. Patent Number 6,178,691.

ARGUMENT

The claims can generally be grouped into three (3) groups. Group A comprises Claims 1-5 and 25 directed toward a horticultural growing medium capable of supporting plant growth constructed of a flexible diphenylmethane diisocyanate (MDI) foam material without filler material with a cation exchange capacity (C.E.C.) ranging from about 1.0 to about 1.5 milliequivalents (meg)/100 g. Group B comprises dependent claims 6-15, modifying Claim 1 to include foams having a neutral pH, pore sizes and pore ranges by foam volume and independent claims 16, 20 and 26 along with dependent claims 17-19 depending from claim 16 and dependent claim 23

depending from claim 20 also directed toward foam characteristics. Group C comprises dependent claims 21 and 22 depending from claim 20 in which the foam material is a sheet with seeds secured thereto or a shaped block with an aperture cut therein.

(A) The Examiner's rejection of Claims 1-5 under 35 USC 103(a) as unpatentable over Hann et al U.S. Patent Number 6,479,433 in view of Garrett U.S. Patent Number 5,617,672 and further in view of the University of Florida *Growth Media* publication reference is not correct and should be reversed.

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate **unfilled foam material** having a cation exchange capacity (C.E.C.) ranging from 1.0 to about 1.5 milliequivalents (meq)/100 g. The absence of a filler material allows live plants to be shipped between countries without the problem of pests and harmful bacteria and disease organisms accompanying the same.

The Examiner argues that Hann et al. '433 discloses a horticultural growing medium (abstract) comprising a flexible diphenylmethane diisocyanate foam material (col. 4 lines 20-29), the horticultural medium being capable of supporting plant growth (abstract); Garrett '672 discloses a foam without filler to grow plants (col. 7 lines 58-65); and that University of Florida Growth Media reference. discloses a cation exchange capacity (CEC) of approximately 1.0 (middle of p. 7).

Hann et al '433 teaches the making of a **horticultural growing medium with at least one filler material**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse

quasi prepolymer chemistry with non-quasi-prepolymer chemistry. There is also no teaching of pH or of C.E.C. or of porosity or of pore size or of sterility.

The Examiner's assertion that the Garrett '672 reference teaches hydroponic (Col 7, ln 58-65, "no soil") use is unsupported by the data presented in the reference itself. Language within the specification indicates that filler material is necessary in order to practice this technology, and in fact, **increased concentrations of ureaformaldehyde foam will retard growth** (Col 3, lns 48-54, "foam can be present from about 5% to about 60% ... to increase the growth rate [and] to decrease the growth rate ... foam can be present in an amount from about 50% to about 90%"). This statement is further supported by the data presented. Figures 4, and 5, and Tables 2 – 4 plainly indicate that in all cases, "shoot weight" (i.e., the best indicia of vigor in the non-tuberous vegetables subject to testing) was inversely related to increasing concentrations of ureaformaldehyde foam, and was correspondingly lowest at the highest concentration of ureaformaldehyde foam (75% PLASTSOIL / 25% Peatlite). No data is presented regarding testing of 100% ureaformaldehyde foam. However, contrary to the aforereferenced statement regarding hydroponic use, extrapolation of the data indicates that plants grown using an exclusively ureaformaldehyde formulation will fail to thrive.

Additionally, the Garrett '672 reference is directed toward a soil additive using a foam having a bulk density of approximately 1 pound per cubic foot. This reference can be dismissed in its entirety as it is directed to ureaformaldehyde foam. As noted on Col 4 lns 59-63: "Generally, the present invention is directed to a plant growth media comprising a ureaformaldehyde foam that can be used to control the growth rate of the plants or to decrease the growth rate of the plants" The foam in powdered form is added to a soil formulation such as natural soils, potting

soil, peatlite, vermiculite, peat moss and mixtures thereof. There is filler material in the foam (carbohydrates additives) either in powder form mixed with soil or as a hydroponics block under any interpretation of the specification. It is readily understood by one of ordinary skill in the art that **ureaformaldehyde foam is made from reacting formaldehyde and urea and is totally different in composition and structure in relation to the unique foam of the present invention.**

Furthermore as noted in Col. 5 lns.19-26 "In a preferred embodiment of the present invention, the ureaformaldehyde foam used is a foam marketed under the trade name PLASTSOIL, which can be obtained Coverfoam Services, Inc. Located in Florance, S.C. PLASTSOIL, which is a predominantly open celled hydrophilic foam, has **an appearance similar to that of "cotton candy" and has a bulk density of approximately 1 pound per cubic foot.**" The present inventive foam is totally different in structure.

Garrett '672 also does not show any cation exchange capacity (hereinafter C.E.C.) for the material, relying upon the organic composition (filler) of the mixture and the carbohydrate additives to provide same. PLASTSOIL is a cellular plastic composition made from reacting formaldehyde and urea in particular concentration unique to PLASTSOIL, carbohydrate such as glucose, fructose, and sucrose can be incorporated into the foam (col. 5, lns. 34-49) *** Although unknown, it is possible that the unexpected results achieved by the process of the of the invention (Garrett '672) are attributable to the carbohydrate additives. (Col. 5, lns. 46-49).

Where used in the process of the Garrett '672 invention, PLASTSOIL is broken down and used in powdered form. (Col. 5, 55-57).

When using the ureaformaldehyde foam in accordance with the Garrett '672 invention, the

foam in powdered form is preferably mixed with a conventional soil formulation and used as a plant growth medium. The foam can be added to a soil formulation in amounts from about 5% to 90% by volume depending upon the circumstances and results desired (col. 5, lns. 58-66). It should be noted that Ureaformaldehyde foam has a residue (ppm) of formaldehyde remaining in the foam material. Garrett '672 does not teach pore size or porosity, C.E.C. or the use of foam without a filler or a sterile foam.

In the present invention it was unexpected that the invented foam formulation would produce a hydrophilic foam with a C.E.C. of from 1.0 to 1.5. As previously noted, **Hann et al. '433 is also directed toward filled foams.**

The University of Florida *Growth Media* reference is directed toward growth media such as peat, pine bark, Sphagnum moss, hardwood bark, Melaleuca bark, animal manure, sawdust, wood shavings, wood residue, bagasse, polyphenolic foam, hydrophilic gels, Perlite, Vermiculite, polystruene foam, rock wool and calcined clays. This reference does not teach or suggest the use of polyurethane foam as a growing media.

C.E.C. is generally discussed in the University of Florida *Growth Media* reference and there is no discussion of a foam having a C.E.C. from 1 to 1.5. The reference simply notes that sands and other low surface area materials have low cation exchange capacities while organic components have a greater ability to retain cations. As noted on page 7 in the University of Florida reference "Pine bark has a cation exchange capacity in the range of 10 to 13 milliequivalents per 100 cubic centimeters while a CEC of approximately 1 is common for builders' sand." Contrary to the allegations of the Examiner, this is not a teaching of a C.E.C. for the foam of the present invention. The University of Florida reference cannot be combined with

the cited art.

In cases which are similar to the present circumstances, the courts have ruled that beyond looking at the prior art to determine if it suggests doing what the inventor has done, one must consider if the prior art provides an expectation of succeeding in the endeavor. *In re Dow Chem.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), "Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure." Id. As noted by the court in the case of *In re Clinton*, "Obviousness does not require absolute predictability, but a reasonable expectation of success is necessary." *In re Clinton*, 527 F.2d 1226, 1228, 188 U.S.P.Q. 365, 367 (C.C.P.A.1976).

As noted by the Court in the case of *In re Gordon*, the mere fact that a prior art reference could be modified to achieve the claimed invention does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir.1984); see also *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989), and *Ex parte Levengood*, 28 U.S.P.Q.2d 1300, 1302 (Bd. Pat. App. & Int. 1993). Applicants respectfully submit that nowhere in the art of record is there any suggestion to arrive at the claimed novel composition of the present invention.

The court in *In re Baird*, 29 USPQ2d 1550 (Fed. Cir. 1994), held that "The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious." The *Baird* court further held that a disclosure to numerous compounds does not render obvious a claim to three compounds, <u>particularly when that disclosure indicates a preference leading away from the claimed compounds</u>.

(B) The Examiner's rejection of Claims 6 and 7 under 35 USC 103(a) as

unpatentable over Hann et al. '433 in view of Garrett '672 and further in view of the University of Florida *Growth Media* reference and further in view of the reference to Buckman and Brady reference is not correct and this rejection should be reversed.

Claims 6 and 7 depend from Claim 1 discussed above and the arguments set forth above are included herein. Additionally, the diphenylmethane diisocyanate unfilled foam material of the current application is at a neutral pH of from 6.8 to 7.8, and is highly porous with a 60 to 40 air to water ratio.

The Examiner argues that Buckman and Brady disclose that soils that accommodate the growth of plants can have a pH from 5 to 9 (p. 36-37) and have variation in the ratio of air to water (p. 9-10).

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate **unfilled foam material** having a cation exchange capacity (C.E.C.) ranging from 1.0 to about 1.5 milliequivalents (meq)/100 g, a neutral pH of 6.8 – 7.8, and a 60 to 40 air to water ratio.

Hann et al '433 teaches the making of a **horticultural growing medium with at least one filler material**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse quasi prepolymer chemistry with non-quasi-prepolymer chemistry.

The Examiner's assertion that the Garrett '672 reference teaches hydroponic (Col 7, ln 58-65, "no soil") use is unsupported by the data presented in the reference itself as previously noted.

In Garrett '672, there is filler material in the foam (carbohydrates additives) under any interpretation of the specification, either in powder form mixed with soil or as a hydroponics

block. It is readily understood by one of ordinary skill in the art that ureaformaldehyde foam is made from reacting formaldehyde and urea and is totally different in composition and structure in relation to the unique foam of the present invention.

The Buckman & Brady reference does not make any reference to polyurethane foam and merely recites that "mineral soils" typically exhibit varying degrees of air and water saturation (see pages 9 & 10). **More importantly, the Buckman & Brady reference recites an optimal soil formulation of 50% pore space and 50% solid matter, with the pore space ideally containing 50% air (i.e., 25% of the whole) and 50% water (i.e., 25% of the whole). This differs markedly from the ideal 60 to 40 air to water ratio claimed in the current application.** Additionally, and contrary to the argument of the Examiner, the Buckman & Brady reference does not disclose the foam pH range as argued by the Examiner and the pH which is discussed is related to soil. In this regard the availability of several of the essential nutrients are noted which are drastically affected by soil pH as is the solubility of certain elements that are toxic to plant growth. As noted, several elements tend to become less available to plants as the pH of soil is raised from 5.0 to 7.5 or 8.0 such as iron, manganese and zinc. These references teach away from the present invention.

(C) The Examiner's rejection of Claims 8-1 1 and 13 under 35 USC 103(a) as unpatentable over Hann et al. '433 in view of Garrett '672 and further in view of the University of Florida reference and further in view of Cook is not correct and this rejection should be reversed.

Claims 8 - 11 and 13 depend from Claim 1 discussed above and the arguments set forth above are incorporated herein. Additionally, the diphenylmethane diisocyanate unfilled foam

material of the current application includes pore sizes from 0.2 microns to 800 microns at varying percentages of foam volume.

The Examiner argues that the Cook (Ask A Scientist) reference discloses pore size in soil from 1500 microns to 1.5 microns.

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate **<u>unfilled foam material</u>** having a cation exchange capacity (C.E.C.) ranging from 1.0 to about 1.5 milliequivalents (meq)/100 g, a neutral pH of 6.8 – 7.8, a 60 to 40 air to water ratio, and pore sizes from 0.2 microns to 800 microns at varying percentages of foam volume.

Hann et al '433 teaches the making of a **horticultural growing medium <u>with at least one filler material</u>**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse quasi prepolymer chemistry with non-quasi-prepolymer chemistry. There is also no teaching of pH or of C.E.C. or of porosity or of pore size or of sterility.

The Examiner's assertion that the Garrett '672 reference teaches hydroponic (Col 7, ln 58-65, "no soil") use is unsupported by the data presented in the reference itself as previously noted. Language within the Garrett '672 specification indicates that filler material is necessary in order to practice this technology, and in fact, **<u>increased concentrations of ureaformaldehyde foam will retard growth</u>**.

Additionally, the Garrett '672 reference is directed toward a <u>soil additive</u> using a foam having a bulk density of approximately 1 pound per cubic foot. This reference can be dismissed in its entirety as it is directed to ureaformaldehyde foam.

As noted on page 7 in the University of Florida *Growth Media* publication reference "Pine bark has a cation exchange capacity in the range of 10 to 13 milliequivalents per 100 cubic centimeters while a CEC of approximately 1 is common for builders' sand." Contrary to the allegations of the Examiner, this is not a teaching of a C.E.C. for the foam of the present invention. The University of Florida reference cannot be combined with the cited art.

The Cook reference does not make any reference to polyurethane foam and only references soil particles. The article is simply with regard to determining the particulate size and size of the pores of different types of soil and the estimation of sandy loam is an average pore size of 0.09mm (90 microns) and clay loam 0.061mm (60 microns). The reference merely provides directions for determining currently extant pore size in soil having a porosity ranging from 43% to 59% depending on the particulate composition and compaction of said material. In contrast, pore size in the instant invention has been determined in order to yield an optimum "porosity ranging from 85% to 95%, preferably from 90% to 92%."

(D) The Examiner's rejection of Claim 12 under 35 USC 103(a) as unpatentable over Hann et al. '433 in view of Garrett '672 and University of Florida *Growth Media* reference. in further view of Decker U.S. Patent Number 5,899,020 is not correct and this rejection should be reversed.

Claim 12 depends from Claim 1 discussed above and the arguments set forth above are included herein. Additionally, the diphenylmethane diisocyanate unfilled foam material of the current application is substantially sterile.

The Examiner argues that Decker '020 discloses the medium being sterile (col. 3, lns. 18-22).

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate **unfilled foam material** having a cation exchange capacity (C.E.C.) ranging from 1.0 to about 1.5 milliequivalents (meq)/100 g, a neutral pH of 6.8 – 7.8, a 60 to 40 air to water ratio, pore sizes from 0.2 microns to 800 microns at varying percentages of foam volume, the material being sterile.

Hann et al '433 teaches the making of a **horticultural growing medium with at least one filler material**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse quasi prepolymer chemistry with non-quasi-prepolymer chemistry. There is also no teaching of pH or of C.E.C. or of porosity or of pore size or of sterility.

The Garrett '672 reference is directed toward a soil additive using a foam having a bulk density of approximately 1 pound per cubic foot. This reference can be dismissed in its entirety as it is directed to ureaformaldehyde foam. It is readily understood by one of ordinary skill in the art that **ureaformaldehyde foam is made from reacting formaldehyde and urea and is totally different in composition and structure in relation to the unique foam of the present invention.**

The University of Florida reference is directed toward growth media such as peat, pine bark, Sphagnum moss, hardwood bark, Melaleuca bark, animal manure, sawdust, wood shavings, wood residue, bagasse, polyphenolic foam, hydrophilic gels, Perlite, Vermiculite, polystruene foam, rock wool and calcined clays. This reference does not teach or suggest the use of polyurethane foam as a growing media.

The C.E.C. is generally discussed in the reference and there is no discussion of a foam having a C.E.C. from 1 to 1.5. The reference simply notes that sands and other low surface area materials have low cation exchange capacities while organic components have a greater ability to retain cations. As noted on page 7 in the University of Florida reference "Pine bark has a cation exchange capacity in the range of 10 to 13 milliequivalents per 100 cubic centimeters while a CEC of approximately 1 is common for builders' sand." Contrary to the allegations of the Examiner, this is not a teaching of a C.E.C. for the foam of the present invention. The University of Florida reference cannot be combined with the cited art.

The Decker '020 reference does not make any reference to polyurethane foam as a growing media. It only references growing warm season grasses (sod) in selected sterile media over plastic sheeting with a sterile medium such as composted yard waste, composted sewage sludge, sand or conifer bark or combination of these materials or practically organic or mineral matter that is relatively inert and that is sterile or can be sterilized economically. This is not a teaching of the present invention.

(E) The Examiner's rejection of Claims 14 and 15 under 35 USC 103(a) as unpatentable over Hann et al '433 in view of Garrett '672 and University of Florida *Growth Media* reference in further view of Caron et al. U.S. Patent Number 6,178,691 is not correct and this rejection should be reversed.

Claims 14 and 15 depend from Claim 1 discussed above and the arguments set forth above are included herein. Additionally, the diphenylmethane diisocyanate unfilled foam material of the current application has a porosity from 80 to 95% or 90 to 92%.

The Examiner argues that Caron et al. '691 discloses a medium having a porosity of 85%

or greater (col. 7, lns. 52-57).

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate **unfilled foam material** having a cation exchange capacity (C.E.C.) ranging from 1.0 to about 1.5 milliequivalents (meq)/100 g, a neutral pH of 6.8 – 7.8, a 60 to 40 air to water ratio, pore sizes from 0.2 microns to 800 microns at varying percentages of foam volume, the material being sterile, and having a porosity from 85% to 95% or 90% to 92%.

Hann et al '433 teaches the making of a **horticultural growing medium with at least one filler material**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse quasi prepolymer chemistry with non-quasi-prepolymer chemistry. There is also no teaching of pH or of C.E.C. or of porosity or of pore size or of sterility.

The Examiner's assertion that the Garrett '672 reference teaches hydroponic (Col 7, ln 58-65, "no soil") use is unsupported by the data presented in the reference itself. As previously noted, language within the specification indicates that filler material is necessary in order to practice this technology, and in fact, increased concentrations of ureaformaldehyde foam will retard growth.

The University of Florida *Growth Media* reference is directed toward growth media such as peat, pine bark, Sphagnum moss, hardwood bark, Melaleuca bark, animal manure, sawdust, wood shavings, wood residue, bagasse, polyphenolic foam, hydrophilic gels, Perlite, Vermiculite, polystruene foam, rock wool and calcined clays. This reference does not teach or suggest the use of polyurethane foam as a growing media.

The reference simply notes that sands and other low surface area materials have low cation exchange capacities while organic components have a greater ability to retain cations. The University of Florida reference cannot be combined with the cited art.

The Caron '691 reference merely teaches an irrigation system for conventional, so-called "peat pots" typically used for starting plants from seed. Caron '691 uses a mat infused with water placed beneath the pots in order to water them via capillary action. The mat itself is merely an irrigation device and not a growth medium. Although not specifically disclosed, it is assumed that the growth medium used in the Caron '691 is conventional soil. In contrast, the instant invention is with regard to a polyurethane foam growth medium. Hence, Caron '691 is rejected with regard to the present invention and the diphenylmethane diisocynate foam growth medium used herein.

(F) The Examiner's rejection of Claims 16-23, 25, 26 under 35 USC 103(a) as unpatentable over Hann '433 in view of Garrett '672 in further view of Cook (Ask A Scientist) publication, University of Florida *Growth Media* reference, and Caron '691 is not correct and this rejection should be reversed.

The claims of the present invention are directed toward a horticultural growing medium capable of supporting plant growth in the form of a diphenylmethane diisocyanate foam having at least 50% of its pores by foam volume ranging in size between 10 and 200 microns with a cation exchange capacity ranging from about 1.0 to about 1.5, a total porosity ranging from about 85% to about 95% and a neutral pH ranging from 6.8 to 7.8.

The Examiner argues that Hann et al. '433 discloses a horticultural growing medium (abstract) comprising a flexible diphenylmethane diisocyanate foam material (col. 4 lns. 20-29; Table II of col. 9 & 10); Garrett '672 discloses the use of a foam without a filler (col. 7, lns. 56-

65); Cook (Ask A Scientist) discloses that pore size in soil can range from 1500 microns to 1.5 microns at various percentages; University of Florida Growth Media reference. discloses a C.E.C. of approximately 1.0: and Caron et al. '691 discloses a medium having a porosity of 85% or greater (col. 7, lns. 52-57).

Hann et al '433 teaches the making of a **horticultural growing medium** **<u>with at least one filler material</u>**. The method of making the foam is with a quasi-prepolymer/filler mixture. A person having ordinary skill in the art to which the subject matter pertains would not confuse quasi prepolymer chemistry with non-quasi-prepolymer chemistry. There is also no teaching of pH or of C.E.C. or of porosity or of pore size or of sterility.

The Examiner's assertion that the Garrett '672 reference teaches hydroponic (Col 7, ln 58-65, "no soil") use is unsupported by the data presented in the reference itself. Language within the specification indicates that filler material is necessary in order to practice this technology, and in fact, **<u>increased concentrations of ureaformaldehyde foam will retard growth</u>** (Col 3, lns 48-54, "foam can be present from about 5% to about 60% ... to increase the growth rate [and] to decrease the growth rate ... foam can be present in an amount from about 50% to about 90%"). This statement is further supported by the data presented. Figures 4, and 5, and Tables 2 – 4 plainly indicate that in all cases, "shoot weight" (i.e., the best indicia of vigor in the non-tuberous vegetables subject to testing) was inversely related to increasing concentrations of ureaformaldehyde foam, and was correspondingly lowest at the highest concentration of ureaformaldehyde foam (75% PLASTSOIL / 25% Peatlite). No data is presented regarding testing of 100% ureaformaldehyde foam. However, contrary to the aforereferenced statement regarding hydroponic use, extrapolation of the data indicates that plants grown using an

exclusively ureaformaldehyde formulation will fail to thrive.

Additionally, the Garrett '672 reference is directed toward a <u>soil additive</u> using a foam having a bulk density of approximately 1 pound per cubic foot. This reference can be dismissed in its entirety as it is directed to ureaformaldehyde foam. As noted on Col 4 lns 59-63: "Generally, the present invention is directed to a plant growth media comprising a ureaformaldehyde foam that can be used to control the growth rate of the plants or to decrease the growth rate of the plants" The foam in powdered form is added to a soil formulation such as natural soils, potting soil, peatlite, vermiculite, peat moss and mixtures thereof. There is filler material in the foam (carbohydrates additives) under any interpretation of the specification, either in powder form mixed with soil or as a hydroponics block. It is readily understood by one of ordinary skill in the art that ureaformaldehyde foam is made from reacting formaldehyde and urea and is totally different in composition and structure in relation to the unique foam of the present invention.

Furthermore as noted in Col. 5 lns.19-26 "In a preferred embodiment of the present invention, the ureaformaldehyde foam used is a foam marketed under the trade name PLASTSOIL, which can be obtained Coverfoam Services, Inc. Located in Florance, S.C. PLASTSOIL, which is a predominantly open celled hydrophilic foam, has **<u>an appearance similar to that of "cotton candy" and has a bulk density of approximately 1 pound per cubic foot</u>**." The present inventive foam is totally different in structure.

Garrett '672 also does not show any cation exchange capacity (hereinafter C.E.C.) for the material, relying upon the organic composition (filler) of the mixture and the <u>carbohydrate additives</u> to provide same. PLASTSOIL is a cellular plastic composition made from reacting formaldehyde and urea in particular concentration unique to PLASTSOIL, carbohydrate such as

glucose, fructose, and sucrose can be incorporated into the foam (col. 5, lns. 34-49) *** Although unknown, it is possible that the unexpected results achieved by the process of the of the invention (Garrett '672) are attributable to the carbohydrate additives. (Col. 5, lns. 46-49).

Where used in the process of the Garrett '672 invention, PLASTSOIL is broken down and used in powdered form. (Col. 5, 55-57).

When using the ureaformaldehyde foam in accordance with the Garrett '672 invention, the foam in powdered form is preferably mixed with a conventional soil formulation and used as a plant growth medium. The foam can be added to a soil formulation in amounts from about 5% to 90% by volume depending upon the circumstances and results desired (col. 5, lns. 58-66). It should be noted that Ureaformaldehyde foam has a residue (ppm) of formaldehyde remaining in the foam material. Garrett '672 does not teach pore size or porosity, C.E.C. the use of foam without a filler or a sterile foam.

In the present invention it was unexpected that the invented foam formulation would produce a hydrophilic foam with a C.E.C. of from 1.0 to 1.5. As previously noted, **Hann et al. '433 is also directed toward filled foams.**

The Cook reference does not make any reference to polyurethane foam and only references soil particles. The article is simply with regard to determining the particulate size and size of the pores of different types of soil and the estimation of clay loam pore size 0.061 (60 microns) and sandy loam pore size of 0.09mm (90 microns). The reference merely provides directions for determining currently extant pore size in soil having a porosity ranging from 43% to 59% depending on the particulate composition and compaction of said material. In contrast, pore size in the instant invention has been determined in order to yield an optimum "porosity ranging

from 85% to 95%, preferably from 90% to 92%."

The University of Florida reference is directed toward growth media such as peat, pine bark, Sphagnum moss, hardwood bark, Melaleuca bark, animal manure, sawdust, wood shavings, wood residue, bagasse, polyphenolic foam, hydrophilic gels, Perlite, Vermiculite, polystruene foam, rock wool and calcined clays. This reference does not teach or suggest the use of polyurethane foam as a growing media.

The C.E.C. is generally discussed in the reference and there is no discussion of a foam having a C.E.C. from 1 to 1.5. The reference simply notes that sands and other low surface area materials have low cation exchange capacities while organic components have a greater ability to retain cations. As noted on page 7 in the University of Florida *Growth Media* reference "Pine bark has a cation exchange capacity in the range of 10 to 13 milliequivalents per 100 cubic centimeters while a CEC of approximately 1 is common for builders' sand." Contrary to the allegations of the Examiner, this is not a teaching of a C.E.C. for the foam of the present invention. The University of Florida reference cannot be combined with the cited art.

The Caron '691 reference merely teaches an irrigation system for conventional, so-called "peat pots" typically used for starting plants from seed. Caron '691 uses a mat infused with water placed beneath the pots in order to water them via capillary action. The mat itself is merely an irrigation device and not a growth medium. Although not specifically disclosed, it is assumed that the growth medium used in the Caron '691 is conventional soil. In contrast, the instant invention is with regard to a polyurethane foam growth medium. Hence, Caron '691 is rejected with regard to the present invention and the diphenylmethane diisocynate foam growth medium used herein.

Since the present invention does not introduce any fillers to the matrix, there is less

possibility to contaminate the matrix and render it un-sterile. Sterile materials conform to agricultural requirements currently in place thus making it easier to ship plants and the media materials across national borders. None of the references teaches the use of an unfilled foam material with a C.E.C. ranging from 1.0 to 1.5, with sterility which has been previously noted as a necessary requirement when shipping plants internationally or has optimum pore sizes and porosity for fluid transfer to the plant. It may be obvious to one of ordinary skill in the art that air water ratios can be altered with the addition of fillers, but it is not obvious how to obtain air water ratios without the use of fillers. When one puts additives in foam, pore size is exceptionally difficult to control. Those skilled in the art would know that fact. Thus pore size is not inherent. Furthermore chemical reactions that take place in filled foam are such that sterility is not inherent in filled foams.

As previously noted the claim of pore size and porosity is a further description of the unique unfilled foam with unexpected properties.

One of ordinary skill in the art would realize that polyurethane foam cannot be made without an isocyanate being one of the ingredients. The present invention uses a unique **unfilled** foam with unexpected properties that support plant growth.

Hann et al '433 and Garrett '672, disclose in the prior art various growth media of foams, which <u>**use filler in the growth media**</u> **because un-filled polyurethane foam was not believed to be a suitable growth media. It was unexpected to discover that the un-filled polyurethane foam of the present invention has the required properties of a suitable growth media, pH, porosity, pore size, C.E.C. ranges and foam material**. C.E.C. is not predictable as it depends upon the structure of molecules that make the foam. Different ingredients in making foam will

give different C.E.C. Density also changes the C.E.C. as do the foaming ingredients and the thousands of variables of additives, each with a different C.E.C.

In cases which are similar to the present circumstances, the courts have ruled that beyond looking at the prior art to determine if it suggests doing what the inventor has done, one must consider if the prior art provides an expectation of succeeding in the endeavor. *In re Dow Chem.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), "Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure." Id. As noted by the court in the case of *In re Clinton*, "Obviousness does not require absolute predictability, but a reasonable expectation of success is necessary." *In re Clinton*, 527 F.2d 1226, 1228, 188 U.S.P.Q. 365, 367 (C.C.P.A.1976).

As noted by the Court in the case of *In re Gordon*, the mere fact that a prior art reference could be modified to achieve the claimed invention does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir.1984); see also *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989), and *Ex parte Levengood*, 28 U.S.P.Q.2d 1300, 1302 (Bd. Pat. App. & Int. 1993). Applicants respectfully submit that nowhere in the art of record is there any suggestion to arrive at the claimed novel composition of the present invention.

The court in *In re Baird*, 29 USPQ2d 1550 (Fed. Cir. 1994), held that "The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious." The *Baird* court further held that a disclosure to numerous compounds does not render obvious a claim to three compounds, <u>particularly when that disclosure indicates a preference leading away from the claimed compounds</u>.

As previously argued, none of the cited references singularly or in combination suggest teach or obviate the present invention and indeed cannot be combined. The examiner has engaged in hindsight application, a prohibited refection since *John Deere* to combine the cited prior art references against the present invention.

The present invention uses a unique **unfilled** foam with unexpected properties that support plant growth and provide a practical solution to a significant problem currently facing sellers of live plants.

Applicants respectfully submit that nowhere in the art of record is there any suggestion or combination to arrive at the claimed novel composition of the present invention.

Garrett (US 5,617,672) and Hann et al. (6,479,433) disclose various growth media of foams, which use filler in the growth media because un-filled polyurethane foam was not believed to be a suitable growth media. It was unexpected to discover that the un-filled polyurethane foam of the present invention has the required properties of a suitable growth media.

SUMMARY OF ARGUMENT

The respective grounds of final rejection of the claims of this application under 35 USC 103(a) are incorrect for the reasons advanced above. Reversal thereof by the Honorable Board of Patent Appeals and Interferences is therefore requested and is earnestly solicited.

Our check in the amount of $250.00 is attached to cover the cost of filing this Brief and two copies and a One Month Extension of Time which is simultaneously filed with this Brief. If any additional fees are incurred, kindly charge the same to our Deposit Account No. 07-1340.

Respectfully submitted,

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CLAIMS APPENDIX

1. A horticultural growing medium comprising:

a flexible diphenylmethane diisocyanate foam material without filler material having a cation exchange capacity ranging from about 1.0 to about 1.5,

said horticultural growing medium being capable of supporting plant growth.

2. The horticultural growing medium of claim 1, wherein said cation exchange capacity is about 1.25.

3. The horticultural growing medium of claim 1, wherein said diphenylmethane diisocyanate foam material is taken from a group consisting of polymeric diphenylmethane diisocyanate, crude diphenylmethane diisocyanate, 4,4'-, 2,4'-, 2,2'-diphenylmethane diisocyanate.

4. The horticultural growing medium of claim 1, wherein said diphenylmethane diisocyanate foam material is polymeric diphenylmethane diisocyanate.

5. The horticultural growing medium of claim 1, wherein said diphenylmethane diisocyanate foam material is one or a mixture of 2,2'-, 2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), polymeric MDI, crude MDI, namely, products of crude diaminodiphenyl methane or a mixture of the same

6. The horticultural growing medium of claim 1, wherein said foam material has a neutral pH ranging from 6.8 to 7.8.

7. The horticultural growing medium of claim 1, wherein said foam material is highly porous and maintains a 60 to 40 air to water ratio.

8. The horticultural growing medium of claim 1, wherein said foam material has at least

50% of its pores by foam volume ranging in size between 10 and 200 microns.

9. The horticultural growing medium of claim 1, wherein said foam material has about 50% of its pores by foam volume ranging in size from about 40 to about 90 microns.

10. The horticultural growing medium of claim 1, wherein said foam material has pores ranging from 20% to about 25% by foam volume which range in size between about 0.2 microns to about 10 microns.

11. The horticultural growing medium of claim 1, wherein said foam material has pores ranging from about 25% to about 35% by foam volume which range in size between about 300 microns to about 800 microns.

12. The horticultural growing medium of claim 1, wherein said foam material is substantially sterile.

13. The horticultural growing medium of claim 1, wherein said foam material has pores of about 30% by foam volume which range in size between about 300 microns to about 800 microns.

14. The horticultural growing medium of claim 1 wherein said foam material has a total porosity ranging from 85% to 95%.

15. The horticultural growing medium of claim 1 wherein said foam material has a total porosity of about 90% to 92%.

16. A horticultural growing medium comprising:

a sterile hydrophilic unfilled foam material made of diphenylmethane diisocyanate having at least 50% of its pores by foam volume ranging in size between 10 and 200 microns with a cation exchange capacity ranging from about 1.0 to about 1.5, said foam material having a total

porosity ranging from about 85% to about 95% and a neutral pH ranging from 6.8 to 7.8;

said horticultural growing medium being capable of supporting plant growth.

17. The horticultural growing medium of claim 16, wherein said foam material is at least one diphenylmethane diisocyanate taken from a group consisting of crude, polymeric, 4,4'-, 2,4'- and 2,2'-diphenylmethane diisocyanate.

18. The horticultural growing medium of claim 16, wherein said foam material is polymeric diphenylmethane diisocyanate.

19. The horticultural growing medium of claim 16, wherein said foam material is one or more of 2,2'-, 2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), crude MDI, polymeric MDI or a mixture of the same.

20. A horticultural growing medium comprising:

a substantially sterile unfilled foam material made of polymeric diphenylmethane diisocyanate taken from a group consisting of one or more of 2,2'-, 2,4'- and 4,4'-diphenylmethane diisocyanate (MDI), crude MDI, products of crude diaminodiphenyl methane including polymeric MDI or a mixture of the same, having at least 50 of its pores ranging in size between 10 and 200 microns with a cation exchange capacity ranging from about 1.0 to about 1.5, with a total porosity ranging from about 90% to about 92% and a neutral pH ranging from 6.8 to 7.,

said horticultural growing medium being capable of supporting plant growth.

21. A horticultural growing medium as claimed in claim 20 wherein said foam material is a sheet with seeds secured thereto.

22. A horticultural growing medium as claimed in claim 20 wherein said foam material is

a shaped block with an aperture cut therein.

23. A horticultural growing medium as claimed in claim 20 wherein said cation exchange capacity is about 1.0.

24. (Canceled)

25. A horticultural growing medium comprising:

a hydrophilic, substantially sterile diphenylmethane diisocyanate foam material without filler material taken from a group consisting of polymeric diphenylmethane diisocyanate, crude diphenylmethane diisocyanate, 4,4'-, 2,4'-, 2,2'-diphenylmethane diisocyanate and having a neutral pH ranging from 6.8 to 7.8, said material having a cation exchange capacity ranging from about 1.0 to about 1.5,

said horticultural growing medium being capable of supporting plant growth.

26. A horticultural growing medium comprising:

a hydrophilic flexible sterile foam material made of diphenylmethane diisocyanate said foam material being taken from a group consisting of crude, polymeric, 4,4'-, 2,4'- and 2,2'-diphenylmethane diisocyanate having at least 50% of its pores by foam volume ranging in size between 10 and 200 microns with a cation exchange capacity ranging from about 1.0 to about 1.5, said foam material having a total porosity ranging from about 85% to about 95%;

said horticultural growing medium being capable of supporting plant growth.

EVIDENCE APPENDIX

There is no evidence to include in this appendix.

RELATED PROCEEDINGS APPENDIX

There are no related proceedings to include in this appendix.